Chapter 1

Introduction

The Department of Energy's (DOE's) Environmental Management (EM) program has made significant progress over the past nine years in meeting the enormous challenge of cleaning up the nuclear weapons complex. Initially the program focused on characterizing waste, assessing the magnitude of contamination, stabilizing material, addressing urgent risks, and achieving compliance. Over time, EM has increased the pace at which it manages waste and cleans up sites. In 1995, EM crossed the threshold and began spending more resources on cleanup than on assessment. Now, EM can focus on completing its mission by establishing an acceleration and closure "strategy". Supported by new management tools and improved estimates of the scope, schedule, and cost, EM is challenging sites to define better and more efficient ways to conduct work to achieve EM's 2006 vision (see text box).

This draft document, *Accelerating Cleanup: Paths to Closure* (hereinafter referred to as *Paths to Closure*), embodies stakeholder[1], regulator, and Tribal Nation views and comments on *Accelerating Cleanup: Focus on 2006 Discussion Draft*. *Paths to Closure* addresses a variety of needs:

- Provides an integrated path forward for the management of the EM complex, based on a life-cycle, project-driven foundation;
- Provides a basis to evaluate EM's annual budgets in a long-term context;
- Responds to Congressional requests for a supportable management strategy on the EM program; and,
- Responds to concerns of stakeholders, regulators, and Tribal Nations.

2006 Vision

By 2006, the Environmental Management program intends to complete cleanup at most of its 53 remaining sites. At a small number of sites, treatment will continue for the few remaining "legacy" waste streams. This vision will drive budget decisions, the sequencing of projects, and the actions needed to meet program objectives. This vision will be implemented in collaboration with stakeholders, regulators, and Tribal Nations.

[1]DOE's stakeholders include those individuals and groups with an interest in DOE's activities: states, city and county governments, Site-Specific Advisory Boards, other grassroots citizen groups, and citizens.

Paths to Closure is not a plan or a decision-making document. Furthermore, it does not anticipate achieving completion of EM work scope at most major EM sites by 2006. The EM program decided to change the name of this document to more accurately reflect what is and is not in this draft "strategy." *Paths to Closure* retains a focus on 2006, which serves as a point in time around which objectives and goals are established.

Paths to Closure describes the status of EM's draft cleanup strategy and a direction forward to complete achievement of the 2006 vision. This document follows publication of *Accelerating Cleanup: Focus on 2006 Discussion Draft* (hereinafter referred to as the *Discussion Draft*) in June 1997 and incorporates improvements made in response to comments from stakeholders, regulators, and Tribal Nations on the site and national versions of the *Discussion Draft*. *Paths to Closure* provides an additional opportunity for stakeholders, regulators, and Tribal Nations to offer their views on the Environmental Management program's cleanup approach prior to issuing *Accelerating Cleanup: Paths to Closure* early this summer.

Achieving the 2006 vision results in significant benefits related to accomplishing EM program objectives. As DOE sites accelerate cleanup activities, risks to public health, the environment, and worker safety and health are all reduced. Finding more efficient ways to conduct work can result in making compliance with applicable environmental requirements easier to achieve. Finally, as cleanup activities at sites are completed, the EM program can focus attention and resources on the small number of sites with more complex cleanup challenges.

1.1 Overview of *Paths to Closure*

Paths to Closure is the Environmental Management program's blueprint for completing the cleanup of contaminated soil, groundwater, and facilities; treating, storing, and disposing of waste; and effectively managing nuclear materials and spent nuclear fuel. The blueprint contains detailed scope, schedules, and costs for completing the work. Further, the blueprint identifies future decisions that must be made and defines the degree of technical and scope uncertainties.

Paths to Closure is a draft strategy for EM's cleanup program; it is not a budget or decision document. *Paths to Closure* should be viewed as a management tool that demonstrates what can be accomplished, assuming a constant funding level over time. The tool allows the EM program to formulate annual budget strategies and goals in the context of effects on life-cycle cleanup costs and schedules. The EM program recognizes that, in any given year, there will be differences between actual budget requests and the level funding amount assumed in *Paths to Closure*. Such differences are inevitable because of the dynamic nature of the budget formulation process. Nevertheless, *Paths to Closure*'s role to inform annual budget deliberations is valuable because the normal range of annual budget variation is small compared with the overall life-cycle costs of the cleanup program. The draft strategy will be updated annually, and these updates will allow the EM program to use the information set forth in *Paths to Closure* to assist in reviewing budget options and

developing the budget. An additional benefit of the annual update is that, because it portrays the life-cycle scope, schedule, and cost for the EM program, it can meet the reporting requirements under the 1994 National Defense Authorization Act.[2]

Paths to Closure represents a major step forward from the *Discussion Draft* issued in June of 1997. The *Discussion Draft* provided an opportunity for Tribal Nations, states, regulators, and other concerned stakeholders to participate in the EM program planning process and to help define innovative approaches that can help to streamline cleanup. *Paths to Closure* seeks to move the cleanup strategy forward from the *Discussion Draft* with a document that is based on improved data and additional management tools and addresses the comments raised by Congress, Tribal Nations, regulators, and stakeholder groups.

The *Discussion Draft* examined four assumed funding levels for completion of the Environmental Management program: (1) $6.0 billion per year (high scenario); (2) $6.0 billion per year with enhanced performance (high scenario); (3) $5.5 billion per year (low scenario); and (4) $5.5 billion per year with enhanced performance (low scenario). To form the basis for the first and third scenarios, estimates were developed by site personnel. For the second and fourth scenarios, the EM program developed estimates based on a number of assumptions that presume a savings that would result from enhanced performance over the life cycle of the cleanup program (see text box).

Discussion Draft Life-cycle Costs

Data Source	Scenario	
	Low	High
Site-Supplied	$156	$146
Enhanced Performance Assumptions	$117	$110

Note:
Costs in billions of constant 1998 dollars.

In *Paths to Closure*, EM decided to utilize a single funding scenario and to include only those enhanced performances that sites could document in baselines. The midpoint of the two *Discussion Draft* funding scenarios—$5.75 billion per year—was selected as the assumed funding level for *Paths to Closure*. EM's selection criteria for the assumed funding level were that the level be reasonable and stable; the selected level meets the criteria.

A variety of factors significantly affect the estimated scope, schedule, and cost of the EM program. Factors such as acceptance of additional facilities into the EM program, application of new technologies, or revisions of regulations, can change over time, altering the assumptions under which the EM program is conducted. To develop a foundation for estimating the scope, schedule, and cost of the program, *Paths to Closure* is based on several key planning assumptions (see text box).

[2]As contained in Section 3153 of Public Law 103-160, codified at 42 U.S. Code 7274k.

Paths to Closure represents a snapshot in time of the cleanup program. However, the dynamic nature of the draft strategy will allow subsequent versions of *Paths to Closure* to reflect revised programmatic assumptions based upon new compliance agreements; the results of analyses prepared under the National Environmental Policy Act (NEPA); Records of Decision signed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); and Statements of Basis, Closure / Post-Closure Plans, and Permits agreed to under the Resource Conservation and Recovery Act (RCRA). In addition, subsequent versions of the draft strategy will reflect advances in technologies, projected savings due to demonstrated enhanced performance, the effects of annual budget allocations, and changes in site end states.

Paths to Closure Assumptions

Area	Assumption
Funding	Level funding at $5.75 billion per year from FY 1999 through program completion.
Facilities	A stable scope of facilities will be addressed in EM baselines.
Waste Mgmt.	After FY 2000, newly generated waste will be the responsibility of the DOE programs that generate it.
Waste Disposal	The Waste Isolation Pilot Plant will open in FY 1998 to receive transuranic waste.
Site End State	End states will be determined by regulators with the involvement of local stakeholders.

Defining end states is a key aspect of defining the scope of the cleanup program. Once the end state of a site is known, the work necessary to achieve that end state can be divided into steps, and the steps can be organized in an appropriate sequence. Currently, *Paths to Closure* is based on the best available end state assumptions for each site with respect to EM activities. However, decisions about end states and cleanup approaches to achieve those end states will be made in accordance with the requirements of NEPA, CERCLA, RCRA, and other applicable statutes and may differ from decisions supported by the assumptions described in this draft document. It should also be noted that the completion of cleanup activities at many sites, as prescribed by EM, does not mean there will no longer be an EM presence at the site. Many sites will require additional surveillance and monitoring funded by EM, and some will have an ongoing, non-EM mission, such as research and development not related to environmental matters (see text box).

Current assumptions about end states do not rule out future decisions to clean up a site to a different end state from that envisioned under those assumptions. In fact, site versions of *Paths to Closure* explicitly state that the end state assumed for purposes of establishing baselines may not represent the ultimate end state of any given site. Improvements in end states may be possible at some time in the future

with the development of new technologies, more economical cleanup approaches, and / or the availability of additional resources.

The EM program is developing an integrated management system to align more closely three aspects of its efforts: the draft cleanup strategy, the annual budget formulation process, and the measurement of results. To facilitate that objective, the EM program organized all cleanup activities into discrete projects. For the first time, an integrated life-cycle database has been developed to maintain information about those projects. The process of establishing specific projects and baselines with scope, schedule, and costs has resulted in significant reductions in EM life-cycle cost estimates since the initiation of the draft cleanup strategy in 1996 (see text box).

A Site is Considered "Complete" (or at its End State) When...

- Deactivation or decommissioning of all facilities currently in the EM program has been completed, excluding any long-term surveillance and monitoring;
- All releases to the environment have been cleaned up in accordance with agreed-upon cleanup standards;
- Groundwater contamination has been contained, and long-term treatment or monitoring is in place;
- Nuclear material and spent fuel have been stabilized and/or placed in safe long-term storage; and
- "Legacy" waste (i.e., waste produced by past nuclear weapons production activities, with the exception of high-level waste) has been disposed of in an approved manner.

1.2 Background of the EM Program and Mission

During the past nine years, the EM program has grown from infancy to its present status as a major focus of DOE. This section provides a brief description of the EM program, its history, and the current context of its efforts to pursue the 2006 vision.

1.2.1 What is the Environmental Management Program?

During the Cold War period of nuclear weapons production, awareness of the effects of environmental pollution grew significantly. Congress enacted a series of stringent environmental protection laws that empower both federal and state regulatory agencies to oversee federal activities affecting the environment. In 1989, DOE established the EM program to address the contamination and waste

Reduction in EM Life-cycle Cleanup Cost Estimates

Since publication of the last life-cycle cost estimate for the EM cleanup program in the 1996 *Baseline Environmental Management Report* the life-cycle cleanup cost estimate has decreased by over $40 billion, when the analyses are adjusted to be comparable. A variety of factors contribute to this decrease:

- Completed cleanup work;
- Reduced overhead and support costs;
- Re-sequenced activities; and
- Improved cross-site integration.

created by nuclear weapons production, research, and testing activities during the Manhattan Project and the Cold War era in a manner consistent with applicable environmental laws. Those activities included mining and milling of uranium, uranium enrichment, fuel and target fabrication, reactor operations, chemical separations, weapons component fabrication, weapons operations, and research, development, and testing.

The primary mission of the EM program is to reduce threats to health and safety posed by contamination and waste (referred to as "legacy" activities or problems) at DOE sites including those associated with the nuclear weapons complex. EM's mission is realized through the following program areas: waste management; stabilization of nuclear material and spent fuel; deactivation and decommissioning of facilities; remedial actions to soil and water; infrastructure and support; and national programs focused on such activities as science and technology development, transportation, emergency management, and pollution prevention.

The EM program manages its cleanup work through 11 Operations/Field Offices across the United States. Those offices are located in the following areas: Albuquerque, New Mexico; Carlsbad, New Mexico[3]; Chicago, Illinois; Idaho Falls, Idaho; Las Vegas, Nevada; Oakland, California; Oak Ridge, Tennessee; Miamisburg, Ohio; Richland, Washington; Jefferson County, Colorado; and Aiken, South Carolina. Each Operations/Field Office is responsible for cleanup activities at one or several sites. The EM program historically has identified 134 "geographic sites" (distinct geographic locations that generated waste or were contaminated by DOE or predecessor agency activities) as part of its scope. These sites are located in 31 states and one territory and encompass an area of over two million acres—equal to the size of Rhode Island and Delaware combined. At the beginning of 1998, cleanup responsibility for 21 sites managed by EM under the Formerly Utilized Sites' Remedial Action Program (FUSRAP) was transferred to the U.S. Army Corps of Engineers. *Paths to Closure* addresses the remaining 113 sites, including required long-term surveillance and monitoring of the 60 sites completed before FY 1998 and environmental management activities for 53 additional sites. Appendix C contains a complete list of sites and completion dates.

1.2.2 Historical Management: From the Cold War to Environmental Cleanup

The threat to national security initiated during World War II led to the development of a substantial, high-security engineering and production operation. Over the past five decades, the Department and its predecessor agencies developed the largest government-owned industry in the United States. This entity was responsible for the research, development, testing, and production of nuclear weapons and a variety of nuclear-related research projects. To protect national security interests, information on these activities was generally limited to a small group of managers, researchers, and workers and was generally kept from public knowledge.

[3]Technically, Carlsbad is an Area Office; however it is included in discussions of Operations/Field Offices throughout this report.

During the Cold War era, the relatively unconstrained availability of resources fostered "level-of-effort" management approaches such as contracting for the full-time commitment of an agreed-upon number of personnel rather than for the accomplishment of specific tasks in specified time frames. Moving the focus of DOE's effort from production to cleanup required that the management and organizational culture move away from the "level-of-effort" approach towards a more open, project-oriented cleanup program in which stakeholders would have effective involvement. After a 50-year operating history, the effort required to make these changes was significant. The abrupt end of the Cold War in the late 1980's also brought an end to the availability of relatively unbounded resources.

Now, the EM program must focus on completing cleanup through the adoption of management strategies based on project needs. The EM program must increase its public accountability, committing itself to public involvement throughout the cleanup process. Further, the EM program must complete its cleanup activities with stabilized funding and staffing levels, while demonstrating measurable progress. All the while, EM must maintain its focus on safety and health and regulatory compliance.

Public Awareness

The EM program has actively sought cooperative relationships with stakeholders, regulators, and Tribal Nations. Through publications such as the *Closing the Circle on the Splitting of the Atom, The Baseline Environmental Management Report, Taking Stock, Linking Legacies,* and now *Paths to Closure*, the EM program has worked to inform the public about the past, present, and future of the nuclear weapons complex and resulting cleanup activities.

1.3 Safety and Health and Regulatory Compliance

Since its inception, the EM program has placed a high priority on achieving its mission in a manner that ensures a safe and healthy workplace, reduces risk, and attains compliance with all applicable regulatory requirements. The draft cleanup strategy embraces those objectives in accelerating cleanup efforts. However, comments of stakeholders, regulators, and Tribal Nations on the *Discussion Draft* expressed concern that initial development of the draft cleanup strategy had focused on defining the scope, schedule, and cost of the cleanup at the perceived expense of these cleanup objectives. This section describes how the EM program will continue its focus on safety and health, and compliance through the draft cleanup strategy.

1.3.1 Safety and Health

A fundamental objective of the EM program is to ensure the protection of workers and the public throughout the conduct of its cleanup mission. The EM program's cleanup workers, including federal employees, contractors, and subcontractors, are the most vulnerable to hazardous exposure and risk. Such workers are frequently

engaged in activities that involve radioactive and toxic wastes, and under conditions that are conducive to industrial accidents. The EM program has a responsibility to protect the safety of its workers; failure to meet that responsibility is unacceptable.

That philosophy is reflected in EM's safety and health policy: "Do Work Safely or Don't Do It." The need to accelerate cleanup and reduce costs does not alter that commitment to safety. In implementing the project-oriented approach presented in *Paths to Closure*, protection of worker health and safety is built into each specific project across the complex. The Environmental Management program is implementing the principles of Integrated Safety Management in all projects so that safety and health become an integral part of project management. That approach is consistent with the best in industry, and it reduces accidents and improves work planning. Those benefits may in turn give rise to performance enhancements through reductions in workers compensation premiums, reduced lost productive time, and enhancements in work planning and execution.

EM's safety and health activities, therefore, become an integral component of EM's planning, budgeting, and accountability management system. In addition, reducing risk to workers, the public, and the environment is an integral element of EM's approach to setting priorities, sequencing project work, and measuring performance. Efforts to accelerate activities can in turn accelerate risk reduction. Initiatives set forth in *Paths to Closure* place priority on projects that eliminate urgent risks.

1.3.2 Regulatory Compliance

The EM program will comply with all activities required under applicable federal, state, and local environmental statutes and regulations; activities required under the terms of permits, administrative orders, or judicial decrees; enforceable milestones or schedules established in agreements negotiated between EM and its regulators; and commitments to the Defense Nuclear Facilities Safety Board (DNFSB). All site versions of *Paths to Closure* reflect and explicitly state this position. To support this position, Operations/Field Offices are required to identify regulatory drivers for projects as well as all significant enforceable agreement milestones. Additionally, all Operations/Field Office budget requests must include an integrated project priority list which is tied to regulatory compliance drivers. EM's commitment to compliance is discussed further in Chapter 4.

The remainder of this report is organized into five chapters and a series of appendices. Chapter 2 summarizes the scope, schedule, and costs for the Environmental Management cleanup program. Chapter 3 provides more detailed scope, schedule, and cost information for three Operations/Field Offices: Rocky Flats, Richland, and Savannah River. (Appendix

E provides analogous information for the remaining eight Operations/Field Offices.) Chapter 4 discusses EM efforts to meet programmatic challenges, largely focusing on mechanisms to accelerate cleanup and reduce costs. Chapter 5 describes the new integrated system EM intends to use to manage the cleanup program. Chapter 6 summarizes opportunities for stakeholder, regulator, and Tribal Nation involvement in the development of the draft cleanup strategy.